Industry discussion on solutions

The third party perspective

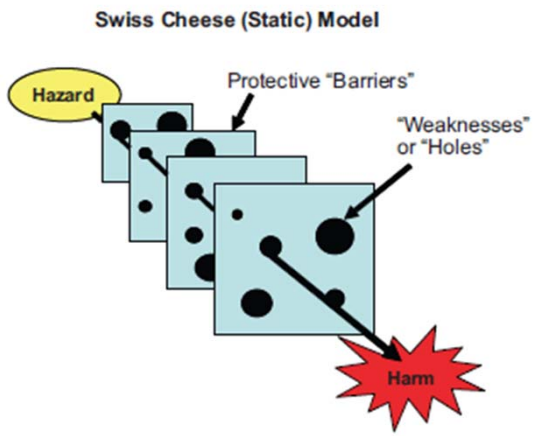
Jason Strouse – Wood Group Kenny

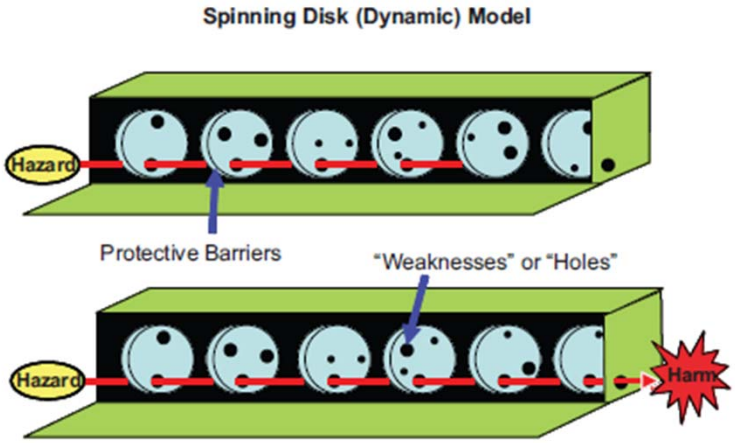
Agenda

- What have we learned
- What are the gaps
- What are the next steps
- Industry initiatives and ongoing activities

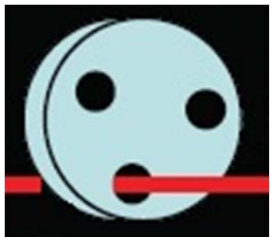
What have we learned:

Poor Communication + Grandfathered Standards + Inadequate Technology = Failure





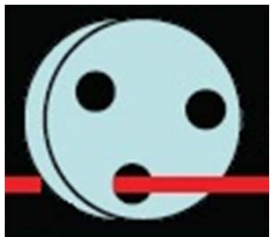
What have we learned:



- When performing safety critical equipment (SCE) evaluations, how does the industry measure performance of subcomponents or barriers?
    - Proper level of scrutiny?
    - Independent verification or validation?
    - Standard part?
    - “Its just how we’ve done things?”

- What qualification standards and verification practices did we use to evaluate our SCEs? What about the subcomponents?
    - Do we know the application for use?
    - Did we consider all failure possibilities?

What are the gaps:



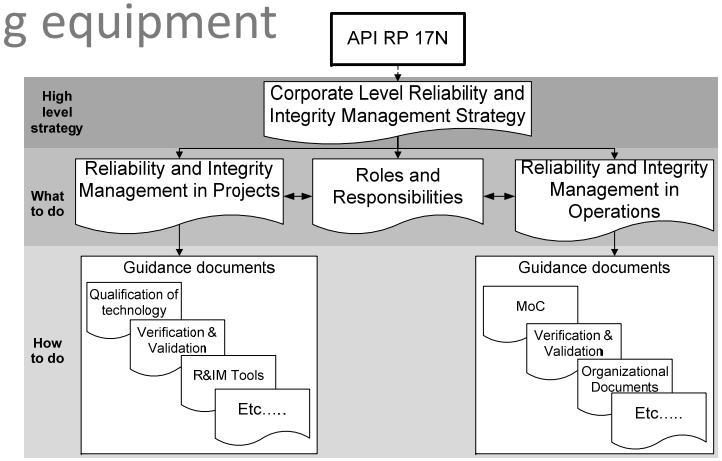
- Performance needs and requirements when planning/ testing/ qualifying equipment
  - Contract management strategies should be performance driven
  - Vendor and supplier auditing practices should be reviewed

- Vendor, Operator, Regulator interfacing (communication) should be proactive to ensure qualification validates that equipment is “safe for use”

- Qualification test programs cannot rely on standards for new and novel technologies and material use information

What are the next steps:

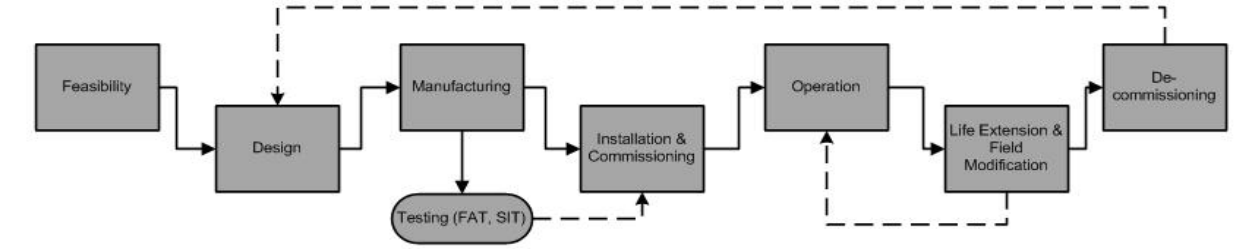
- Clearly establish and communicate requirements when planning, qualifying and validating equipment

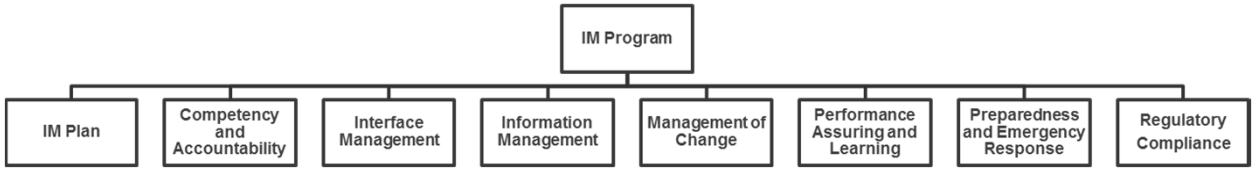


- Expand research initiatives to ensure alignment of goals:
  - High pressure high temperature (HPHT)
  - New and exotic material qualifications
  - Subsea processing
  - Align cross-industry TRLs/TRCs (performance ratings)

What are the next steps:

- Development of comprehensive lifecycle management tools for safety critical equipment





- Independent testing to be conducted to ensure operability of the system
  - Reliability and performance standards
  - Root cause analysis of failure should be reported to vendor/supplier
  - Share lessons learned across industry

Industry initiatives and ongoing activities:

- Internal and external standardization efforts
  - SPE standardization effort
- SURF-IM Joint Industry Project
  - Example: SCM reliability
- Other Joint Industry Projects and best practices
- Increase collaboration:
  - Society of Petroleum Engineers (SPE)
  - American Petroleum Institute (API)
  - American Society of Mechanical Engineers (ASME)
  - And others (ASTM, NACE, etc.)

References

- American Petroleum Institute. 2010. *Process Safety Performance Indicators for the Refining and Petrochemical Industries*, API-RP-754, First Edition, April 2010, 54. API Publishing Services, Washington D.C.
- American Petroleum Institute. 2009. *Recommended Practice for Subsea Production System Reliability and Technical Risk Management*, API-RP-17N, First Edition, March 2009, 107. API Publishing Services, Washington D.C.

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